



Patented
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Review Board

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brevetés

Baby-Boomer Effect on Prescription Expenditures and Claims

Impacts of Demographic Change on Provincial Public
Drug Plans in Alberta, Saskatchewan, Manitoba,
New Brunswick and Nova Scotia

December 2010



National Prescription Drug Utilization Information System

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About the PMPRB

The Patented Medicine Prices Review Board (PMPRB) is an independent quasi-judicial body established by Parliament in 1987.

The PMPRB has a dual role: to ensure that prices at which patentees sell their patented medicines in Canada are not excessive; and to report on pharmaceutical trends of all medicines and on R&D spending by patentees.

The PMPRB reports annually to Parliament, through the Minister of Health, on its activities, on pharmaceutical trends relating to all medicines, and on the R&D spending by patentees.

The NPDUIS Initiative

The National Prescription Drug Utilization Information System (NPDUIS) provides critical analyses of drug price, utilization, and cost trends in Canada to support drug plan policy decision-making for participating federal, provincial, and territorial governments.

The NPDUIS initiative is a partnership between the PMPRB and the Canadian Institute for Health Information. It was established in 2001 by the federal/provincial/territorial Ministers of Health.

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Executive Summary

In 2011, the oldest members of the baby-boomer generation will turn 65. This demographic shift will herald dramatic changes in health care expenditures, including an increase in spending for prescription medications and an increase in the number of reimbursement claims.

Based on public drug plan data from five provinces, Alberta, Saskatchewan, Manitoba, New Brunswick and Nova Scotia, this report focuses on the sector of the population that is 65 years of age or older and covered by provincial drug plans.

The study analyzes recent historical data (2002–2006) and the projected future growth in expenditures and number of prescriptions over a 25-year period (2006–2031). Future growth is predicted based on the 2006 per beneficiary cost for each 5-year period.

Although many factors contribute to the average annual growth rate (AAGR) in prescription medication expenditures (including the regulation of pharmaceuticals and market structure), for the purpose of this study, only the effects of demographic change are considered. It is important to note that the findings in this study cannot be extrapolated to other Canadian population groups or other sectors of the health care system.

Historical Analyses (2002–2006)

From 2002 to 2006, Alberta experienced the greatest AAGR in prescription expenditures (6.6%), followed by New Brunswick (6.2%), Manitoba (5.7%), Saskatchewan (5.5%) and Nova Scotia (5.3%).

When the impact of demographic change was isolated, Alberta once again had the most pronounced increase in AAGR at 3.3%. The other four provinces experienced a slower growth: New Brunswick (1.3%), Manitoba (1.1%), Nova Scotia (0.8%) and Saskatchewan (0.6%).

Projection Analyses (2011–2031; base year: 2006)

Over this period, Alberta is expected to experience the highest AAGR in Rx expenditure attributable to demographic change at 3.8%. Other predicted future growth in prescription expenditures, attributable to demographic change, is regionally clustered: New Brunswick and Nova Scotia are expected to experience the next highest impact with an AAGR of 2.9% each over the 25-year period. Manitoba and Saskatchewan are expected to be the least affected by future demographic changes, with a projected AAGR in Rx dollars of 2.4% and 1.9%, respectively.

From 2006 to 2031, projections indicate that Alberta will experience a 2.52-fold increase in prescription expenditures due to demographic impact. During the same time period, prescription expenditures in New Brunswick and Nova Scotia are expected to slightly more than double, as compared to their 2006 base levels, while Manitoba is projected to have a 1.81-fold increase and a 1.62-fold increase is predicted for Saskatchewan.

Estimated expenditure increases attributable to demographic change will be moderate in the first time period (2006–2011), followed by a higher sustained growth for the next three time periods (2011–2016, 2016–2021, 2021–2026). A slower growth of prescription expenditures will be experienced during the last period from 2026 to 2031.

The outcome measures (growth rates, ratios), whether they are associated with prescription expenditures or the number of claims, are similar in their respective provinces.

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1 Introduction

Baby boomers, defined as individuals born between 1946 and 1965, have had a pronounced influence on our culture, politics and economy. In 2006, nearly one in three Canadians fell into this category, with an age range between 41 and 60 years. By 2011, the first of the baby-boomer generation will be 65 years of age and will be eligible for the drug plan coverage provided by many of the provincial/territorial governments. This will have a significant impact on health care expenditures, including pharmaceuticals.

To support decision makers in the health care field in planning for future financial and operational demands, the impact of demographic change on provincial public drug plan expenditures and the number of claims were approached historically (2002–2006) and prospectively (2011–2031). Due to the availability of data, these analyses were restricted to five Canadian provinces: Alberta, Saskatchewan, Manitoba, New Brunswick and Nova Scotia.

Over the years, baby boomers will move through various age–sex cohorts, increasing and decreasing their numbers within these groups. Since the cost per beneficiary varies across the age–sex cohorts, total prescription expenditures will be affected by the shifting demographic profile. In this report, the expenditures attributed to demographic impact were calculated based on the 2006 per beneficiary cost for each 5-year age–sex cohort aged 65 years or over.

Although prescription expenditures and the number of claims, whether they are public or private, are influenced by a wide range of factors (including the incidence and treatment of diseases, the structure of pharmaceutical markets and government policy), this research paper does not attempt to quantify the effects of factors other than demographics. Projections assume that the impacts of other influencing factors will not change from the beginning to the end of projection period.

It is beyond the scope of this paper to evaluate the impact of an aging population on overall government expenditures. The findings cannot be extrapolated to other population groups or health care sectors.

2 Background

2.1 Demographic Projections

The underlying assumptions for the population projections used in this study were produced by Statistics Canada using a component methodology to account for regional differences. The data for each of the provinces are listed in Table 1 (Statistics Canada 2005).

The age-sex composition of the Canadian population will change considerably from 2002 to 2031. As illustrated in Figures 1 and 2, the population of the <50-year-old age group will undergo only a minimal change. There will be a significant increase in the

groups between 50 and 65 years of age, and the most considerable increase will be in the groups that are 65 years of age or older (as indicated by the gap between the 2002 and 2031 curves).

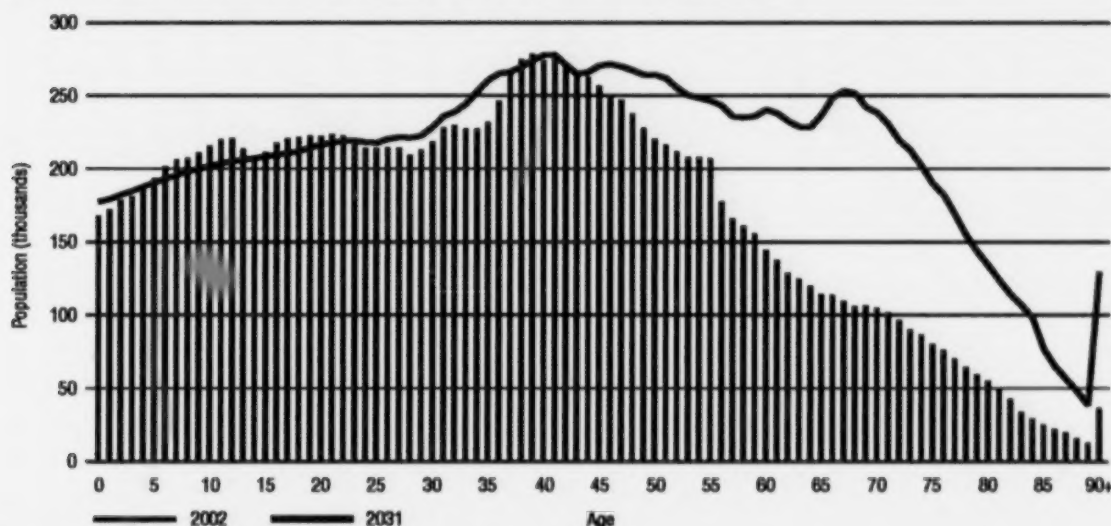
This shift in population can also be examined by considering the percentage of the total Canadian population that is composed of individuals older than 65. As shown in Figure 3, the steepest rate of increase in this segment of the population occurs during the projected study period (2011–2031). This is followed by a slower, but still positive, rate of change.

Table 1. Component assumptions for a medium-growth scenario for 2031^a

	Mortality rate (years)		Total fertility rate per woman	Immigration rate (%)	Total emigration rate (%)	Net interprovincial migration (thousands)
	Males	Females				
Alberta	82.2	86.1	1.69	0.49	0.17	4.2
Saskatchewan	81.3	85.9	1.83	0.18	0.10	-1.2
Manitoba	81.1	85.3	1.80	0.70	0.12	-4.3
New Brunswick	81.3	85.8	1.39	0.09	0.06	2.6
Nova Scotia	81.1	85.3	1.37	0.17	0.08	3.7

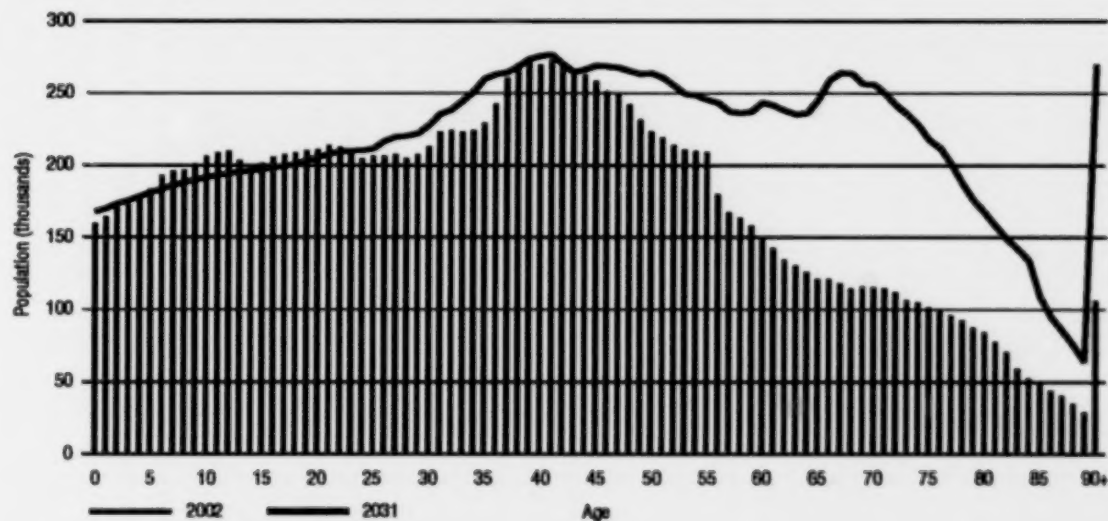
^a Source: Statistics Canada (2005).

Figure 1. Age distribution of the male population in Canada in 2002 and 2031¹



¹ The spike in the curve is due to the high level of aggregation in the 90+ category.

Figure 2. Age distribution of the female population in Canada in 2002 and 2031¹



¹ The spike in the curve is due to the high level of aggregation in the 90+ category.

Figure 3. Percentage of the Canadian population aged 65 and older, 1971–2055

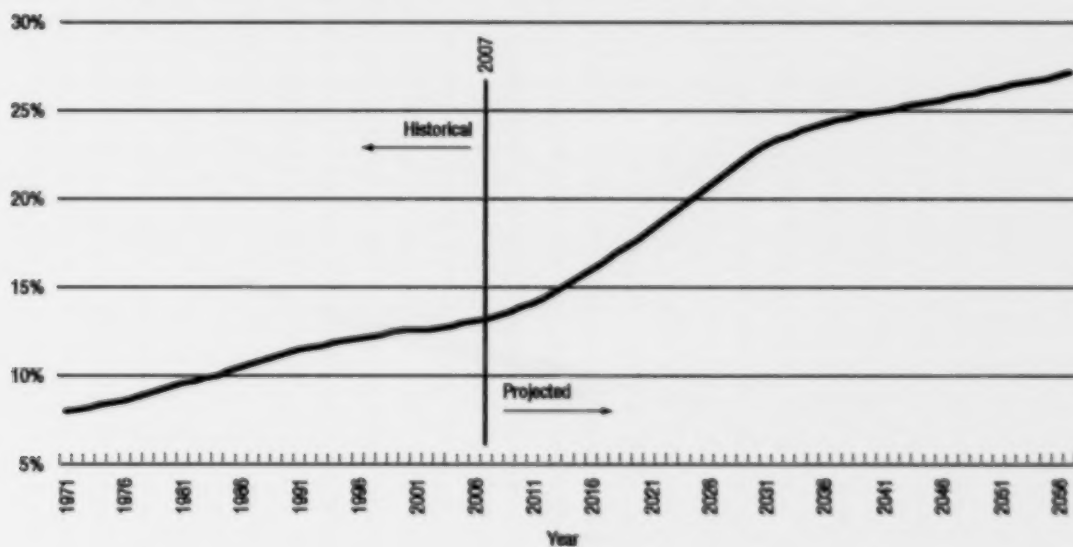
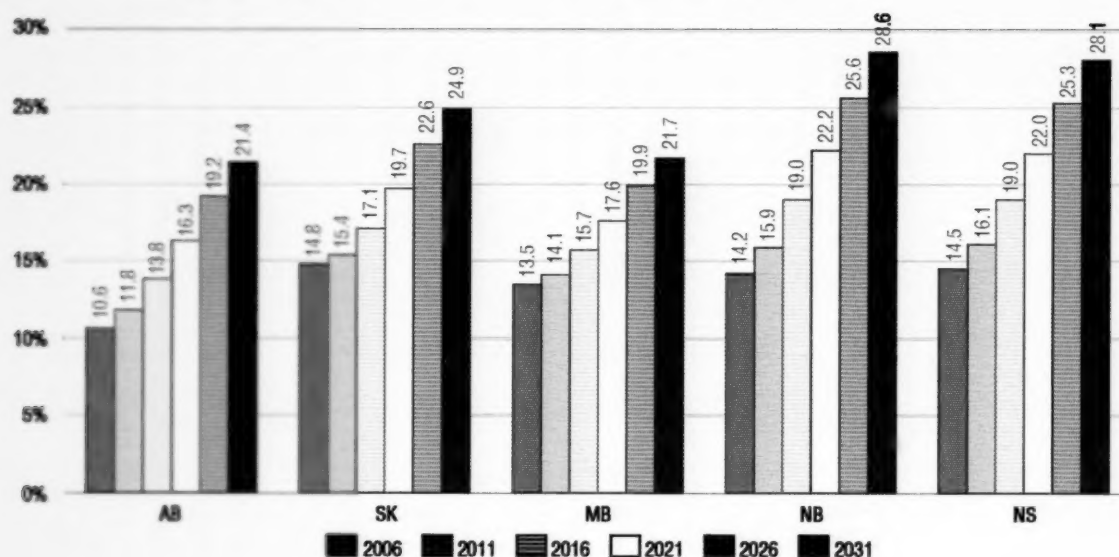


Figure 4. Percentage of the population aged 65 and older by province, 2006–2031



Among the five provinces studied in this report, there is a considerable variation in the proportion of their populations that are 65 years of age or older (see Figure 4). In 2006, Saskatchewan had the largest percentage of senior citizens at 14.8%; Nova Scotia, New Brunswick and Manitoba had somewhat lower proportions at 14.5%, 14.2% and 13.5%, respectively; and Alberta had a significantly lower proportion of 10.6%. This distribution is projected to change over the 25-year study period.

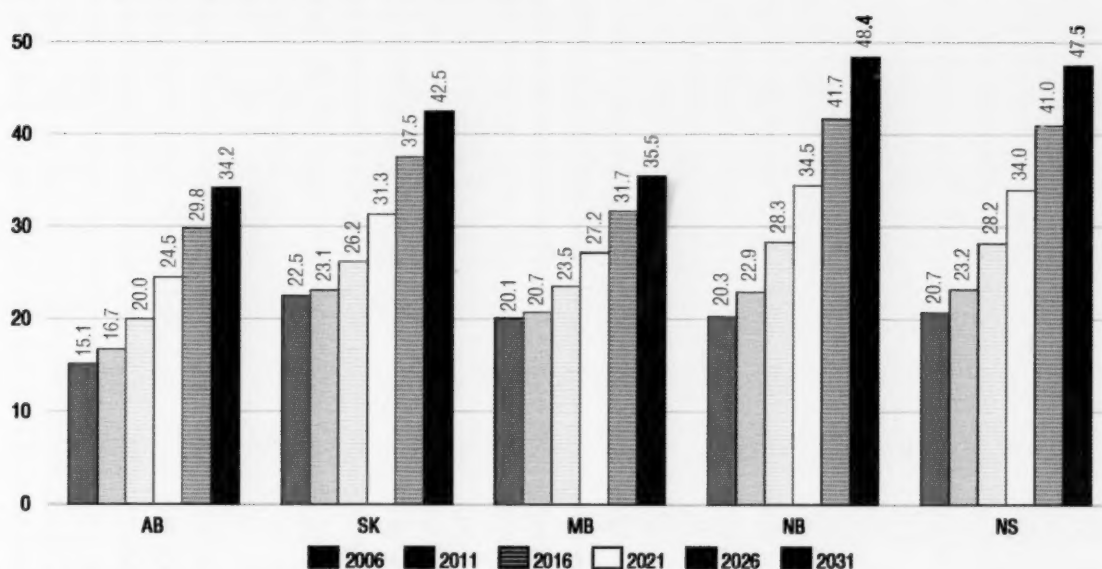
Beginning in 2011, New Brunswick and Nova Scotia are expected to overtake the other provinces.

For example, the percentage of New Brunswick's population proportion aged 65 and over will steadily increase from 14.2% to 28.6% during the 25-year period. Although Alberta will also experience a substantial increase, it will continue to have the lowest percentage of its population in this category. Manitoba will experience the least change in the proportion of its population aged 65 and over, increasing from 13.5% to 21.7%.

Table 2. Projected population of those 65 years of age and over by province, 2006–2031

	Population (thousands)				
	AB	SK	MB	NB	NS
2006	350.3	147.2	159.8	106.7	136.0
2011	410.0	151.0	170.8	120.7	152.9
2016	505.8	167.0	196.1	144.9	182.1
2021	627.2	192.1	226.9	170.5	213.0
2026	767.0	220.9	263.2	196.9	246.6
2031	888.1	243.4	294.8	219.4	275.6
	Percent change				
	AB	SK	MB	NB	NS
2006–2011	17.0%	2.6%	6.9%	13.1%	12.4%
2011–2016	23.4%	10.6%	14.8%	20.0%	19.1%
2016–2021	24.0%	15.0%	15.7%	17.7%	17.0%
2021–2026	22.3%	15.0%	16.0%	15.5%	15.8%
2026–2031	15.8%	10.2%	12.0%	11.4%	11.8%

Figure 5. Dependency ratio by province, 2006–2031¹



¹ Source: Statistics Canada (2005).

Although it has the lowest proportion of the population aged 65 or over, Alberta has the greatest number of individuals in this group. It is followed by Manitoba, Saskatchewan, Nova Scotia and New Brunswick, respectively (see Table 2). This ranking is relatively consistent throughout the study period. For each time period, Alberta is predicted to experience the largest increases in this population group, while Saskatchewan is expected to experience the smallest increases.

Figure 5 illustrates dependency ratios: the number of persons aged 65 year and over per 100 persons of working age (15 to 64). These ratios increase significantly across all of the provinces during the study period. In the province of New Brunswick, for instance, there were an estimated 20.3 seniors per 100 persons of working age in 2006. By 2031, it is projected that there will be 48.4 seniors per 100 persons of working age.

2.2 Provincial Public Drug Plan Information for Alberta, Saskatchewan, Manitoba, New Brunswick and Nova Scotia

Table 3 provides basic information on the provincial government drug coverage for those aged 65 years and older. With the exception of Manitoba, all of the provincial drug plans have programs specifically geared to seniors. Manitoba's coverage of senior citizens is administered through a system of income-tested deductibles. In Saskatchewan, the senior population may access benefits through the public drug plan's broader programs (Special Support) or a senior-specific program, which introduced income-tested eligibility in July 2007. As can be seen in the table, Saskatchewan, New Brunswick and Nova Scotia also vary their benefits according to income indirectly through the Guaranteed Income Supplement (GIS).

In Manitoba, deductibles must be met before the provincial government drug plan provides assistance. In Saskatchewan, deductibles are administered in all plans except for the Seniors' drug plan. Nova Scotia is the only province in the study that applies a premium prior to the receipt of benefits.

Table 3. Provincial public drug plan coverage for senior citizens (CIHI 2008)^a

Province	Program plan	Eligibility of beneficiaries	Premium	Deductible	Co-payment	Maximum annual co-payment
Alberta	Seniors	≥ 65 years of age	None	None	30% of prescription to a maximum \$25 per prescription	n/a
Saskatchewan	Special Support Program	All residents	None	3.4% of adjusted family income	Individualized % of prescription cost, based on income and total drug costs	n/a
	Seniors' Drug Plan ^b	• ≥ 65 years of age • Income tested	None	None	Maximum of \$15 per prescription subject to approval	n/a
	Guaranteed Income Supplement (GIS) ^c or Saskatchewan Income Plan (SIP)	Receiving either • SIP benefits or • GIS and residing in special-care home	None	\$100 semi-annual family deductible	\$15 per prescription up to deductible; after deductible is met, the co-payment is 35% up to a maximum of \$15 per prescription	n/a
		Receiving GIS and living in community	None	\$200 semi-annual family deductible		n/a
Manitoba	Pharmacies	All residents	None	2.56% to 5.0% of adjusted family income	None	None
New Brunswick	Prescription Drug Program – Plan A	Seniors with GIS (income tested)	None	None	\$9.05 per prescription	\$250
		Seniors without GIS	None	None	\$15 per prescription	n/a
Nova Scotia ^d	Seniors Pharmacare Program	Seniors with GIS	None	None	33% of prescription cost with a minimum of \$3	\$382
		Seniors without GIS	Up to \$424 per year	None		

^a For more information on provincial government drug plan coverage, please visit the following Web sites: www.health.gov.ab.ca/ahcip_prescription.html, www.health.gov.sk.ca/ps_drug_plan.html, www.gov.mb.ca/health/pharmacare/index.html, www.gov.nh.ca/0212/intro-e.asp, www.gov.ns.ca/health/pharmacare/default.html

^b Changes to Seniors' Drug Plan, effective July 2007, include income testing. Individuals must be eligible for federal age credit, which is based on the annual net income reported on line 236 of the income tax form in the previous year (source: <http://www.health.gov.sk.ca/seniors-prescription-drug-plan>).

^c The Guaranteed Income Supplement (GIS) is established by the federal government as an additional benefit to low-income seniors who already receive Old Age Security.

^d Premiums and co-payment maximums updated since publication of CIHI report. See http://www.gov.ns.ca/health/Pharmacare/seniors_pharmacare/Seniors_Information_Booklet_2008.pdf

Co-payments, either in the form of a flat rate or as a percentage of prescription drug cost, are applied in all of the provinces with the exception of Manitoba. A maximum or ceiling on co-payments is applied in the provinces of Nova Scotia and New Brunswick.

This research includes only the expenditures accepted by the public drug plans for citizens 65 years of age or older. A portion of these expenditures, in the form of deductibles or co-payments, may have been paid by beneficiaries or other parties.

Table 4. Prescription expenditures percentage capture rate 2006

	Total public plan prescription expenditures for 65+ beneficiaries ^a (millions)	Total prescribed drug expenditures (public and private funding) ^b (millions)	Percentage share of expenditure data captured in report
Alberta	\$519.7	\$1,813.6	28.7%
Saskatchewan	\$166.1	\$576.0	28.8%
Manitoba	\$210.4	\$654.3	32.2%
New Brunswick	\$104.7	\$534.5	28.9%
Nova Scotia	\$155.7	\$613.3	25.4%

^a Source: NPDUIS database.^b Source: CIHI (2008).

To determine the proportion of prescription expenditures captured in this study, total prescription expenditures obtained from the National Drug Utilization Information System (NPDUIS) database for beneficiaries aged 65 or older were divided by the total provincial expenditures for prescribed drugs. This denominator included both private and publicly funded sources (CIHI 2008). As illustrated in Table 4, the percentage of prescription expenditures captured in this report ranges from 25.4% in Nova Scotia to 32.2% in Manitoba.

2.3 Data Sources

The main databases used for this research include the following:

- NPDUIS database for the Alberta, Saskatchewan, Manitoba, New Brunswick and Nova Scotia public drug plan data
- Statistics Canada's Population Projections Database for provincial age-sex population projections from 2011 to 2031; along with Canadian projected population numbers up to 2055
- Statistics Canada's Demographic Estimation Compendium 2006 for provincial and national population statistics, 1971–2006.

Provincial drug plan data (beneficiaries, prescription expenditures and number of claims) by 5-year age-sex cohorts for those 65 years of age and older was extracted from the NPDUIS database. At the start of this project, 2002 to 2006 data was available for Alberta, Saskatchewan, Manitoba, New Brunswick and Nova Scotia public drug plans.

In the historical analysis, each province's actual expenditures were adjusted for inflation by their respective Consumer Price Indexes, as provided by Statistics Canada.

The data obtained from the NPDUIS database was limited by the following parameters:

- active beneficiaries 65 years of age or older
- drugs with an assigned DIN (drug identification number)
- selected jurisdictions: Alberta, Saskatchewan, Manitoba, New Brunswick and Nova Scotia

In an effort to make interprovincial comparisons as accurate as possible, this study was based on prescription expenditures and the number of claims approved for payment prior to the adjudication of claims according to plan deductibles.

3 Methodology

The methodology is explained in terms of prescription expenditures. Except for the adjustment for inflation, the same methodology was applied to the number of claims. The method of calculating average costs per age-sex cohort and multiplying the values by the projected population of interest in each respective age-sex cohort has been widely used (Garrett and Martini 2007; CIHI 2005; Denton et al. 2002).

3.1 Historical Analyses: 2002–2006

Two sets of prescription expenditures are provided:

1. actual prescription expenditures; and
2. prescription expenditures calculated using the 2006 average beneficiary cost for each age-sex cohort.

In the first case, actual expenditures were extracted from the database, adjusted for inflation and expressed in 2006 dollars. The year-over-year percent changes and average annual growth rates (AAGRs) of actual prescription expenditures were influenced by several factors, including demographic impact.

In the second case, the number of beneficiaries for each 5-year age-sex cohort for each year (2002–2006) was multiplied by the respective 2006 average cost per beneficiary. The expenditures in this case are greater than actual numbers, since the average cost per beneficiary increased over the historical period. In this instance, the year-over-year percentage increases and AAGRs represent the growth due to demographic impact alone.

3.2 Projection Analyses: 2011–2031

From the NPDUIS database (number of beneficiaries) and Statistics Canada's population estimates, the beneficiary participation rates for each 5-year age-sex cohort were calculated for 2004, 2005 and 2006 (Statistics Canada 2006). To estimate the projected number of beneficiaries, the median participation rate was then applied to the projected population for each 5-year age-sex cohort for the following years: 2011, 2016, 2021, 2026 and 2031.

The projected number of beneficiaries for each of these cohorts was then multiplied by the respective 2006 average beneficiary cost. Since the average cost per beneficiary does not change, projected expenditures are automatically expressed in 2006 dollars. The percent changes and AAGRs in expenditures (number of claims) represent changes attributable to demographic impact alone.

Expenditure ratios were calculated by dividing the total projected expenditures in a given year by actual expenditures in the base year (2006). This ratio represents the factor by which expenditures have increased. For example, a ratio of 1.50 would indicate that expenditures in a given year increased by a factor of 1.50 or by 50%, as compared to the base year.

Further information and formulas can be found in Appendix 1.

4 Number of Active Beneficiaries

In 2006, the number of active beneficiaries 65 years of age and older was greatest in Alberta (318,400), followed distantly by Manitoba (146,400) and Saskatchewan (133,500). Nova Scotia and New Brunswick had fewer than 100,000 active beneficiaries: 95,200 and 62,400, respectively.

As shown in Table 5, the AAGR for the number of active beneficiaries between 2002 and 2006 was highest in Alberta at 3.3% and lowest in Saskatchewan at 0.6% (New Brunswick 1.3%, Manitoba 1.1% and Nova Scotia 0.9%).

Table 5. Number of active beneficiaries 65 years of age and older (in thousands) — Historical analysis, 2002–2006

	Alberta		Saskatchewan		Manitoba		New Brunswick		Nova Scotia	
	No.	% change ^a	No.	% change ^a	No.	% change ^a	No.	% change ^a	No.	% change ^a
2002	279.9	—	130.4	—	140.2	—	59.3	—	92.0	—
2003	288.6	3.1%	130.7	0.3%	141.9	1.3%	59.6	0.5%	92.3	0.2%
2004	297.8	3.2%	131.5	0.6%	143.3	1.0%	60.3	1.1%	93.0	0.8%
2005	308.0	3.4%	132.7	0.9%	145.0	1.2%	61.4	1.8%	94.1	1.2%
2006	318.4	3.4%	133.5	0.6%	146.4	1.0%	62.4	1.8%	95.2	1.2%
AAGR		3.3%		0.6%		1.1%		1.3%		0.9%

^a Year-over-year % change.

5 Prescription Expenditures

5.1 Historical Analysis: 2002–2006

In 2006, the rank of provinces in terms of absolute prescription expenditures followed the same order as the number of active beneficiaries, with a high of \$519.7 million in Alberta and low of \$104.7 million in New Brunswick (see Tables 6–10).

The AAGR of actual prescription expenditures over this period was highest in Alberta (6.6%), followed by New Brunswick (6.2%), Manitoba (5.7%), Saskatchewan (5.5%) and Nova Scotia (5.3%).

When the growth in expenditures attributable to demographic impact was isolated, Alberta led once again with an AAGR of 3.3%. It was followed distantly by New Brunswick (1.3%) and Manitoba (1.1%). Both Nova Scotia and Saskatchewan experienced a prescription expenditure growth due to demographic impact of less than 1.0% (0.8% and 0.6%, respectively).

Table 6. Prescription expenditures—Alberta

	Actual prescription expenditures (2006 constant dollars)		Prescription expenditures (using 2006 average cost per beneficiary)	
	\$ millions	Year-over-year % change	\$ millions	Year-over-year % change attributable to demographic change
2002	\$401.9	—	\$456.0	—
2003	\$428.8	6.7%	\$470.7	3.2%
2004	\$469.7	9.5%	\$486.0	3.3%
2005	\$498.2	6.1%	\$502.6	3.4%
2006	\$519.7	4.3%	\$519.7	3.4%
	AAGR	6.6%	AAGR attributable to demographic change	3.3%

Table 7. Prescription expenditures—Saskatchewan

	Actual prescription expenditures (2006 constant dollars)		Prescription expenditures (using 2006 average cost per beneficiary)	
	\$ millions	Year-over-year % change	\$ millions	Year-over-year % change attributable to demographic change
2002	\$134.1	—	\$162.0	—
2003	\$145.2	8.3%	\$162.5	0.3%
2004	\$150.7	3.8%	\$163.5	0.6%
2005	\$155.6	3.2%	\$165.0	0.9%
2006	\$166.1	6.7%	\$166.1	0.6%
	AAGR	5.5%	AAGR attributable to demographic change	0.6%

Table 8. Prescription expenditures—Manitoba

	Actual prescription expenditures (2006 constant dollars)		Prescription expenditures (using 2006 average cost per beneficiary)	
	\$ millions	Year-over-year % change	\$ millions	Year-over-year % change attributable to demographic change
2002	\$168.4	—	\$201.5	—
2003	\$186.6	10.8%	\$204.0	1.3%
2004	\$198.8	6.5%	\$206.1	1.0%
2005	\$201.3	1.2%	\$208.5	1.2%
2006	\$210.4	4.5%	\$210.4	0.9%
	AAGR	5.7 %	AAGR attributable to demographic change	1.1%

Table 9. Prescription expenditures—New Brunswick

	Actual prescription expenditures (2006 constant dollars)		Prescription expenditures (using 2006 average cost per beneficiary)	
	\$ millions	Year-over-year % change	\$ millions	Year-over-year % change attributable to demographic change
2002	\$82.4	—	\$99.6	—
2003	\$87.0	5.6%	\$100.1	0.6%
2004	\$93.9	7.9%	\$101.1	1.0%
2005	\$98.8	5.2%	\$102.9	1.8%
2006	\$104.7	5.9%	\$104.7	1.7%
	AAGR	6.2%	AAGR attributable to demographic change	1.3%

Table 10. Prescription expenditures—Nova Scotia

	Actual prescription expenditures (2006 constant dollars)		Prescription expenditures (using 2006 average cost per beneficiary)	
	\$ millions	Year-over-year % change	\$ millions	Year-over-year % change attributable to demographic change
2002	\$126.8	—	\$151.1	—
2003	\$132.4	4.3%	\$151.4	0.2%
2004	\$143.0	8.0%	\$152.4	0.7%
2005	\$149.6	4.6%	\$154.0	1.0%
2006	\$155.7	4.1%	\$155.7	1.1%
	AAGR	5.3%	AAGR attributable to demographic change	0.8%

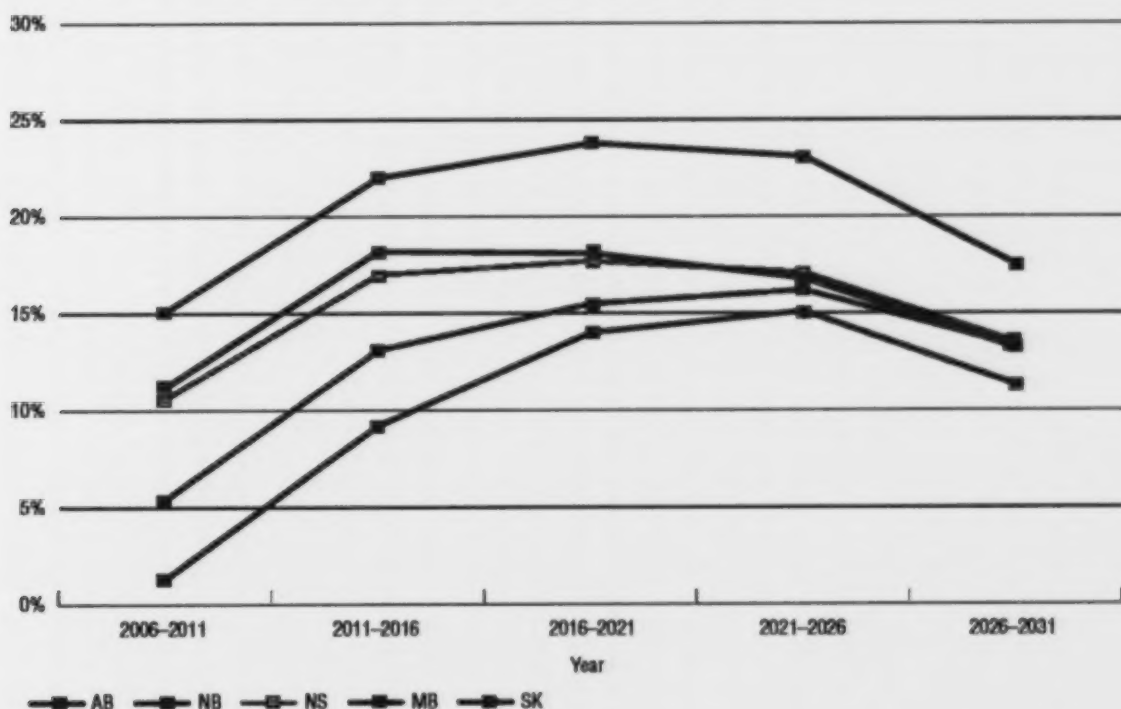
5.2 Projected Prescription Expenditures: 2011–2031

Figure 6 displays the percent changes for projected prescription expenditures for all of the provinces. Although the trends of the curves appear to be consistently concave, it is important to note the differences in the magnitude of the projected increases and the time periods when growth rates in the expenditures are expected to have reached their ceiling.

The province of Alberta should experience the largest increase in expenditures across all time periods, ranging from 15.1% (2006–2011) to a peak of 23.8% (2016–2021).

Some geographical similarity in the trends is also apparent. That is, the two Atlantic provinces (New Brunswick and Nova Scotia) and the two Prairie provinces (Saskatchewan and Manitoba) are closely aligned. As an extension of these observations, regional economic activity and migration patterns may be significant factors to consider in public expenditure projections.

Figure 6. Percent changes in projected prescription expenditures by province



For all of the jurisdictions, the rate of expenditure increase is both elevated and sustained over the three middle time periods (2011–2016, 2016–2021 and 2021–2026). The downward slope of the curve over the last projected time period indicates that the rate of expenditure increase remains positive, but decelerates between 2026 and 2031.

Projected prescription expenditures, in absolute terms, will be greatest in the province of Alberta, followed by Manitoba, Nova Scotia, Saskatchewan and New Brunswick (see Table 11).

The AAGRs of prescription expenditures follow the same pattern as the percentage increases in the previous graph. Although AAGRs of 0.3% to 4.4% may not be noteworthy at first glance, the projections are based on changes resulting from demographic shifts alone. That is, the potential impact of all other factors has not been integrated in this analysis. Historically, other influencing factors have had a greater impact than demographics alone.

Table 11. Projected total prescription expenditures and AAGRs based on demographic change

Projected total prescription expenditures (2006 constant dollars, millions)					
	Alberta	Saskatchewan	Manitoba	New Brunswick	Nova Scotia
2006 ^a	\$519.7	\$166.1	\$210.4	\$104.7	\$155.7
2011	\$598.4	\$168.2	\$221.8	\$116.4	\$172.2
2016	\$730.1	\$183.7	\$250.9	\$137.6	\$201.4
2021	\$904.1	\$209.4	\$289.8	\$162.5	\$237.0
2026	\$1,112.7	\$241.0	\$336.8	\$189.8	\$277.6
2031	\$1,307.2	\$268.3	\$381.4	\$214.9	\$315.0
Average annual growth rates					
	Alberta	Saskatchewan	Manitoba	New Brunswick	Nova Scotia
2006–2011	2.9%	0.3%	1.1%	2.2%	2.0%
2011–2016	4.1%	1.8%	2.5%	3.4%	3.2%
2016–2021	4.4%	2.7%	2.9%	3.4%	3.3%
2021–2026	4.2%	2.9%	3.1%	3.2%	3.2%
2026–2031	3.3%	2.2%	2.5%	2.5%	2.6%
AAGR for 25-year period (2006–2031)	3.8%	1.9%	2.4%	2.9%	2.9%

^a Represents actual 2006 prescription expenditures.

5.2.1 Expenditure Ratios

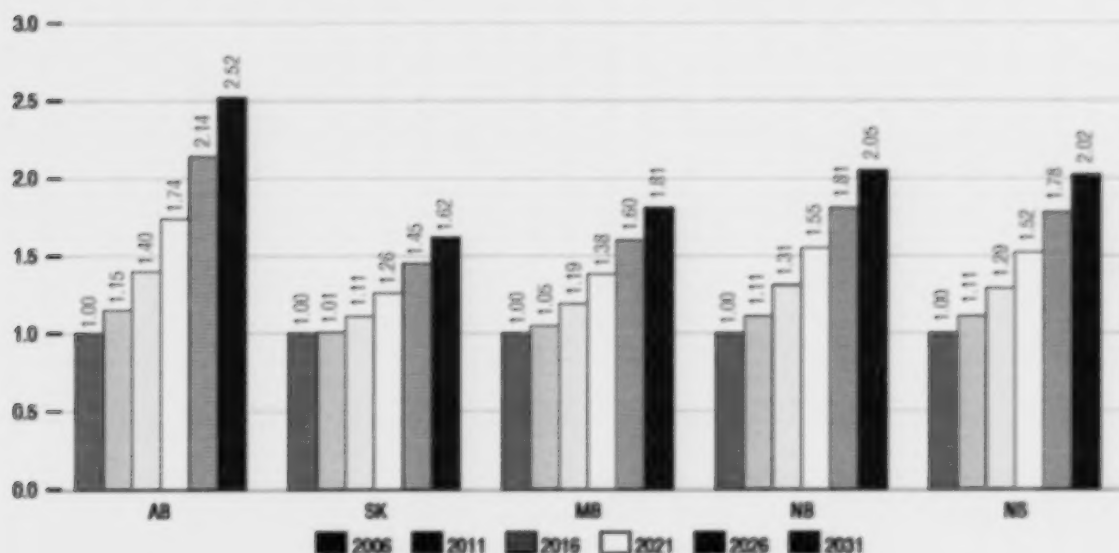
In addition to percentage increases and AAGRs, the cumulative effect of changing demographics can also be demonstrated using expenditure ratios. The ratios shown in Figure 7 use 2006 base year prescription expenditures. For example, the Nova Scotia cost ratio of 1.29 indicates that expenditures will increase by a factor of 1.29 (29% increase) in 2016, as compared to 2006.

The cumulative impact of demographic change is expected to be greatest in Alberta. By 2021, this province's expenditures will increase by a factor of 1.74 (74% increase) due to demographic change alone. By 2031, expenditures are expected to increase by a factor of 2.52 (152% increase) given the current demographic projections.

The provinces of New Brunswick and Nova Scotia are expected to experience similar demographic impacts: their expenditures are projected to increase by a factor of 1.55 and 1.52, respectively, in 2021. By 2031, they will more than double their 2006 base year expenditures. In New Brunswick, prescription expenditures are expected to increase by a factor of 2.05 (105% increase), while Nova Scotia expenditures are expected to increase by a factor of 2.02 (102% increase).

Manitoba follows the two Atlantic provinces, but leads its neighbouring province of Saskatchewan. From 2006 to 2031, expenditures are expected to increase by a factor of 1.81 (81% increase) in Manitoba, while the demographic impact on Saskatchewan is expected to increase its expenditures by a factor of 1.62 (62% increase).

Figure 7. Expenditure ratios by province (projected year / 2006 base year total prescription costs)



6 Number of Claims

6.1 Historical Analysis: 2002–2006

In 2006, the rank of provinces in absolute numbers of claims followed the same order as the number of active beneficiaries and of prescription expenditures. The values ranged from a high of 7,582,500 in Alberta to a low of 1,900,600 in New Brunswick (see Tables 12–16).

The AAGR of the number of actual claims was highest in Manitoba (6.8%), followed by Alberta (5.0%), New Brunswick (3.9%), Saskatchewan (3.5%) and Nova Scotia (2.4%).

Looking at the AAGRs of the number of claims based on demographic impact alone, Alberta once again had the highest growth rate (3.5%). Manitoba (1.3%) and New Brunswick (1.2%) had much lower growth rates, and Nova Scotia and Saskatchewan both experienced AAGRs of 0.7%.

Table 12. Number of claims—Alberta

	Actual number of claims		Number of prescription transactions (using 2006 average number of claims per beneficiary)	
	Thousands	Year-over-year % change	Thousands	Year-over-year % change attributable to demographic change
2002	6,227.7	—	6,603.3	—
2003	6,598.8	6.0%	6,830.1	3.4%
2004	6,998.6	6.1%	7,065.8	3.5%
2005	7,193.2	2.8%	7,319.0	3.6%
2006	7,582.5	5.4%	7,582.5	3.6%
AAGR		5.0%	AAGR attributable to demographic change	3.5%

Table 13. Number of claims—Saskatchewan

	Actual number of claims		Number of prescription transactions (using 2006 average number of claims per beneficiary)	
	Thousands	Year-over-year % change	Thousands	Year-over-year % change attributable to demographic change
2002	3,812.8	—	4,262.0	—
2003	3,941.9	3.4%	4,279.2	0.4%
2004	4,062.6	3.1%	4,308.1	0.7%
2005	4,206.7	3.5%	4,350.5	1.0%
2006	4,379.8	4.1%	4,379.8	0.7%
AAGR		3.5%	AAGR attributable to demographic change	0.7%

Table 14. Number of claims—Manitoba

	Actual number of claims		Number of prescription transactions (using 2006 average number of claims per beneficiary)	
	Thousands	Year-over-year % change	Thousands	Year-over-year % change attributable to demographic change
2002	3,834.8	—	4,723.8	—
2003	4,077.6	6.3%	4,793.4	1.5%
2004	4,338.4	6.4%	4,860.5	1.4%
2005	4,650.8	7.2%	4,924.7	1.3%
2006	4,980.3	7.1%	4,980.3	1.1%
	AAGR	6.8%	AAGR attributable to demographic change	1.3%

Table 15. Number of claims—New Brunswick

	Actual number of claims		Number of prescription transactions (using 2006 average number of claims per beneficiary)	
	Thousands	Year-over-year % change	Thousands	Year-over-year % change attributable to demographic change
2002	1,633.8	—	1,813.2	—
2003	1,700.2	4.1%	1,824.0	0.6%
2004	1,761.7	3.6%	1,839.6	0.9%
2005	1,822.3	3.4%	1,869.4	1.6%
2006	1,900.6	4.3%	1,900.6	1.7%
	AAGR	3.9%	AAGR attributable to demographic change	1.2%

Table 16. Number of claims—Nova Scotia

	Actual number of claims		Number of prescription transactions (using 2006 average number of claims per beneficiary)	
	Thousands	Year-over-year % change	Thousands	Year-over-year % change attributable to demographic change
2002	2,749.5	—	2,936.2	—
2003	2,834.4	3.1%	2,942.6	0.2%
2004	2,929.5	3.4%	2,962.4	0.7%
2005	2,955.9	0.9%	2,990.3	0.9%
2006	3,021.5	2.2%	3,021.5	1.0%
	AAGR	2.4%	AAGR attributable to demographic change	0.7%

6.2 Projected Number of Claims: 2011–2031

Figure 8 displays the projected percent changes for the number of claims by province. As previously seen in the analysis of prescription expenditures, the trends of the curves are consistently concave.

The province of Alberta is expected to experience the largest increase in number of claims, ranging from 15.5% in 2006–2011 to a peak of 22.8% in 2016–2021.

Once again, a geographical similarity in the trends is noted. The two Atlantic provinces (New Brunswick and Nova Scotia) and the two Prairie provinces (Saskatchewan and Manitoba) are closely aligned.

For all of the jurisdictions, the rate of growth in the number of claims is both elevated and sustained over the three middle time periods (2011–2016, 2016–2021 and 2021–2026). During the last projected time period, the increase in the rate of claims decelerates significantly, but still remains positive.

The projected number of claims, in absolute terms, will be greatest in the province of Alberta, followed by Manitoba, Saskatchewan, Nova Scotia and

New Brunswick (see Table 17). The AAGRs of number of claims follow the same pattern as the percentage increases in Figure 8. The AAGRs of the number of claims will be greatest in Alberta, ranging from 2.9% in 2006–2011 to 4.2% in both 2016–2021 and 2021–2026. Meanwhile, Saskatchewan is projected to have the lowest AAGRs for the number of claims, ranging from 0.2% in 2006–2011 to 2.8% in 2021–2026.

6.2.1 Prescription Transaction Ratios

The interpretation of the prescription transaction ratios is similar to that of expenditure ratios (see section 5.2.1). Figure 9 demonstrates the cumulative effect of demographic change through the use of prescription transaction ratios, using 2006 as the base year for the number of claims. For instance, the Nova Scotia prescription transaction ratio of 1.28 indicates that the number of claims is expected to increase by 28% between 2006 and 2016.

Due to demographic impact alone, the number of claims is expected to increase significantly over the 2006–2031 time period. Specifically, the number of claims will increase by the following factors: 2.51 in Alberta, 2.04 in New Brunswick, 2.01 in Nova Scotia, 1.76 in Manitoba and 1.60 in Saskatchewan.

Figure 8. Percent changes in projected number of prescription transactions

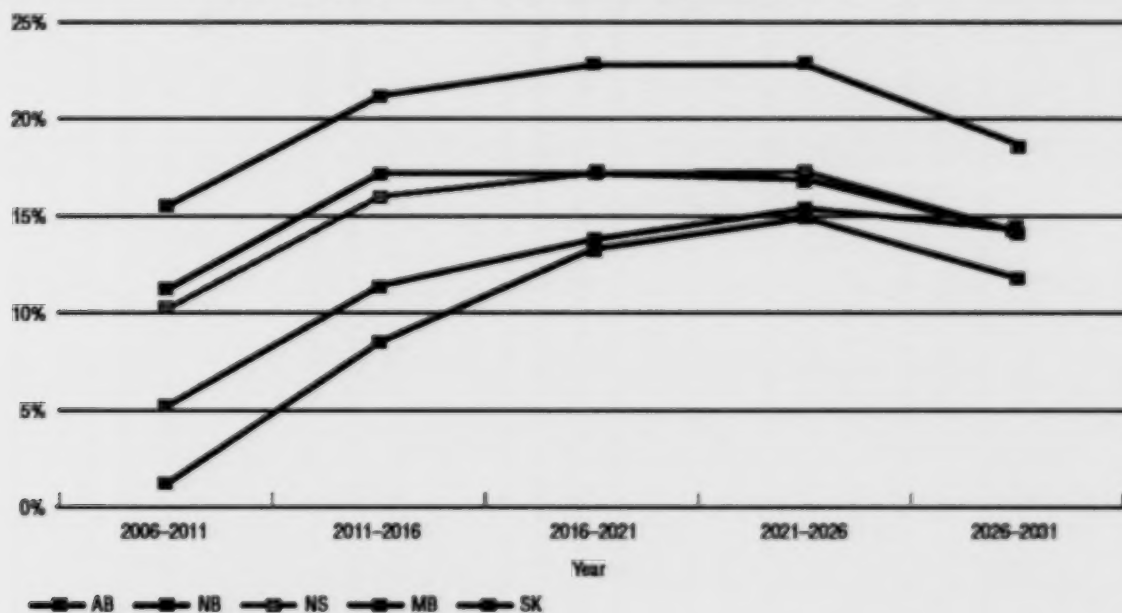
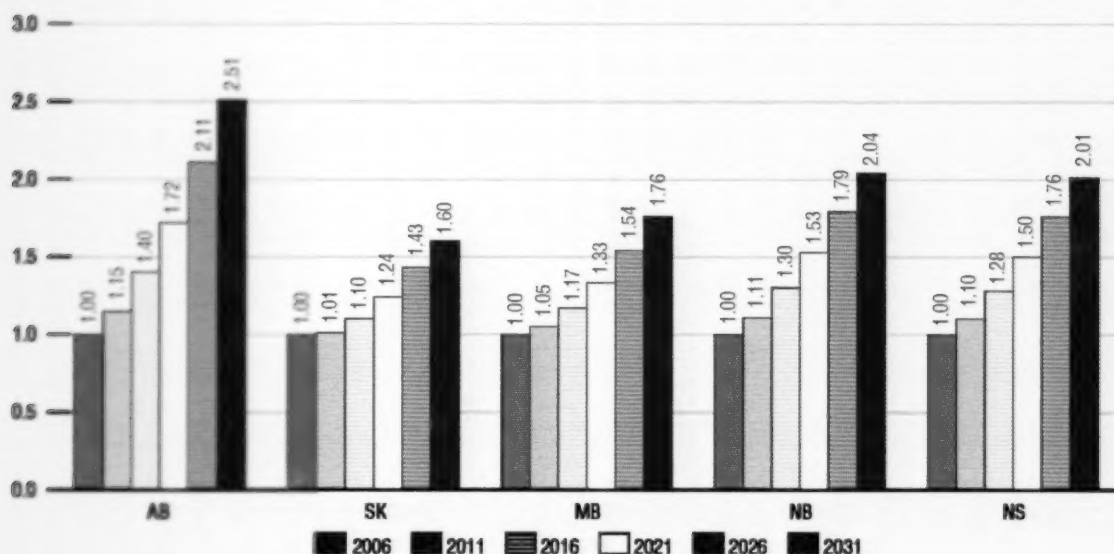


Table 17. Projected total number of claims and AAGRs based on demographic change

	Projected total number of claims (thousands)				
	Alberta	Saskatchewan	Manitoba	New Brunswick	Nova Scotia
2006 ^a	7,582.5	4,379.8	4,980.3	1,900.6	3,021.5
2011	8,757.7	4,432.8	5,241.0	2,113.6	3,330.3
2016	10,612.9	4,811.8	5,838.7	2,477.5	3,863.4
2021	13,035.4	5,450.4	6,647.3	2,903.3	4,528.0
2026	16,008.5	6,260.5	7,669.5	3,395.0	5,312.9
2031	18,996.6	7,000.8	8,765.9	3,878.0	6,065.0
	Average annual growth rates				
	Alberta	Saskatchewan	Manitoba	New Brunswick	Nova Scotia
2006–2011	2.9%	0.2%	1.0%	2.1%	2.0%
2011–2016	3.9%	1.7%	2.2%	3.2%	3.0%
2016–2021	4.2%	2.5%	2.6%	3.2%	3.2%
2021–2026	4.2%	2.8%	2.9%	3.2%	3.2%
2026–2031	3.5%	2.3%	2.7%	2.7%	2.7%
AAGR for 25-year period (2006–2031)	3.7%	1.9%	2.3%	2.9%	2.8%

^a Represents actual 2006 number of claims.

Figure 9. Prescription transaction ratios (projected year / 2006 base year total prescription costs)



7 Prescription Expenditures versus Number of Claim Transactions

Prescription expenditures and the number of claim transactions are expected to follow similar (upward or downward) trends, but they can differ due to a number of reasons:

- policy changes that either limit or extend the time period (days supply) for which a prescription can be filled;

- population shifts into 5-year age-sex cohorts where either higher or lower cost drugs are prescribed;
- changes in physician prescribing patterns from higher cost to lower cost treatment, or vice versa.

As seen in Table 18, the growth rates due to demographic impact alone are very similar when prescription expenditures and the number of claims are compared.

Table 18. Comparison of average annual growth rates (AAGR) due to demographic impact for prescription expenditures (PE) and prescription claim transactions (PT)

Historical analysis										
	Alberta		Saskatchewan		Manitoba		New Brunswick		Nova Scotia	
	PE	PT	PE	PT	PE	PT	PE	PT	PE	PT
2002–2006	3.3%	3.5%	0.6%	0.7%	1.1%	1.3%	1.3%	1.2%	0.8%	0.7%
Projection analysis										
	Alberta		Saskatchewan		Manitoba		New Brunswick		Nova Scotia	
	PE	PT	PE	PT	PE	PT	PE	PT	PE	PT
2006–2011	2.9%	2.9%	0.3%	0.2%	1.1%	1.0%	2.2%	2.1%	2.0%	2.0%
2011–2016	4.1%	3.9%	1.8%	1.7%	2.5%	2.2%	3.4%	3.2%	3.2%	3.0%
2016–2021	4.4%	4.2%	2.7%	2.5%	2.9%	2.6%	3.4%	3.2%	3.3%	3.2%
2021–2026	4.2%	4.2%	2.9%	2.8%	3.1%	2.9%	3.2%	3.2%	3.2%	3.2%
2026–2031	3.3%	3.5%	2.2%	2.3%	2.5%	2.7%	2.5%	2.7%	2.6%	2.7%
2006–2031	3.8%	3.7%	1.9%	1.9%	2.4%	2.3%	2.9%	2.9%	2.9%	2.8%

8 Conclusions

Historically (2002–2006), actual prescription expenditures have grown at an average annual growth rate (AAGR) of between 5.3% in Nova Scotia and 6.6% in Alberta. The AAGRs of prescription expenditures due to demographic impact alone are as follows: Alberta: 3.3%; New Brunswick: 1.3%; Manitoba: 1.1%; Nova Scotia: 0.8%; and Saskatchewan: 0.6%.

The projected numbers do not include increases due to other factors, such as technology change, prescribing patterns or intensification of treatment. As such, the projected numbers probably underestimate what the public drug plans will actually experience in the future, both in terms of the total prescription expenditures and the number of claims. This research paper has not attempted to estimate the future impact of any other influence.

By 2016, the AAGRs of prescription expenditures attributable to demographic change alone will be significantly higher than the historical rates in their respective provinces. Between 2016 and 2021, for instance, the AAGRs of prescription expenditures attributable to demographic change are projected to be as follows: Alberta: 4.4%; New Brunswick: 3.4%; Manitoba 2.9%; Nova Scotia: 3.3%; and Saskatchewan: 2.7%.

By 2031, prescription expenditures will increase by a factor of 2.52 in Alberta, 1.62 in Saskatchewan, 1.81 in Manitoba, 2.05 in New Brunswick and 2.02 in Nova Scotia due to demographic change.

Similar conclusions can also be applied to the number of claims: over the 25-year time period, the number of claims are projected to increase by a factor of 2.51 in Alberta, 1.60 in Saskatchewan, 1.76 in Manitoba, 2.04 in New Brunswick and 2.01 in Nova Scotia.

The impact of demographic changes on drug plans is noteworthy; however, these findings cannot be extrapolated to the general population or other sectors of the health care system.

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Appendix 1: Methodology and Formulas

A. Historical Analyses

i. Adjustment for Price Inflation:

$$\text{Constant Dollars}_{CYJ} = (\text{Expenditures}_{CYJ}) \times (\text{CPI Adjustment Factor}_{CYJ})$$

$$\text{CPI Adjustment Factor}_{CYJ} = \text{CPI}_{BYJ} / \text{CPI}_{CYJ}$$

where

- CPI = Provincial Consumer Price Index
- BY = Base Year (2006)
- CY = Current Year
- J = Jurisdiction

ii. Historical Calculations using 2006 per Beneficiary Costs/Claims

$$\text{Expenditures}_{CY}^{SA} = (\text{ACB}_{BY}^{SA}) \times (\text{Number of Beneficiaries}_{CY}^{SA})$$

where

- DI = Demographic Impact
- ACB = Average Cost per Beneficiary
- S = Sex
- A = 5-year cohort for age categories ≥ 65 years up to 89 years, 90+
- BY = Base Year (2006)
- CY = Current Year (2002 to 2006)

$$\text{Number of Claims}_{CY}^{SA} = (\text{ANCB}_{BY}^{SA}) \times (\text{Number of Beneficiaries}_{CY}^{SA})$$

where

- DI = Demographic Impact
- ANCB = Average Number of Claims per Beneficiary
- S = Sex
- A = 5-year cohort for age categories ≥ 65 years up to 89 years, 90+
- BY = Base Year (2006)
- CY = Current Year (2002 to 2006)

B. Projected Year Analyses

i. Projected Expenditures

$$\text{Constant Dollar Expenditures}_{PYJ}^{SA} = \text{ACB}_{BYJ}^{SA} [(\text{PR}_J^{SA}) \times (\text{Population}_{PYJ}^{SA})]$$

where

- ACB = Average Cost per Beneficiary
- PR = Median Participation Rate over last 3 years of NPDUIS data
- S = Sex
- A = 5-year cohort for age categories ≥ 65 years up to 89 years, 90+
- BY = Base Year (2006)
- PY = Projected Year

ii. Projected Number of Claims

$$\text{Number of Claims}_{PYJ}^{SA} = \text{ANCB}_{BYJ}^{SA} [(\text{PR}_J^{SA}) \times (\text{Population}_{PYJ}^{SA})]$$

where

- ANCB = Average Number of Claims per Beneficiary
- PR = Median Participation Rate over last 3 years of NPDUIS data
- S = Sex
- A = 5-year cohort for age categories ≥ 65 years up to 89 years, 90+
- BY = Base Year (2006)
- PY = Projected Year

C. General Analyses

i. Average Annual Growth Rate

$$\text{AAGR} = (e^{(\ln(\text{value at end of period}) - \ln(\text{value at beginning of period}) / (T-1))} - 1)$$

where

- AAGR = Average Annual Growth Rate
- e = 2.718 which is the natural logarithm
- T = Number of years in the period

Appendix 2: Glossary of Terms

Consumer Price Index (CPI): An indicator of changes in consumer prices experienced by Canadians on national or provincial/territorial level. CPI consists of a fixed basket of commodities commonly purchased by Canadians.

Dependency Ratio for those 65 years of age and over: The ratio of the senior population to those in the working-age population (15 to 64 years).

Drug Identification Number (DIN): A number assigned by Health Canada to a drug product prior to being marketed in Canada.

Guaranteed Income Supplement (GIS): An additional benefit to low income seniors who already receive Old Age Security, established by federal government.

Number of Active Beneficiaries: The number of people for whom the public plan/program has accepted at least part of at least one claim, either towards a deductible (if applicable) or for payment.

Number of Claims: The number of claims where at least part of the claim was accepted by the public plan/program, either toward a deductible (if applicable) or for payment.

Prescription Expenditures: Sum of the total dollar amount of claims accepted by the plan/program as eligible for payment, either toward a deductible (if applicable) or for payment.